

U.S. Patent Application Serial No. 09/884,998  
Amendment filed December 27, 2006  
Reply to OA dated September 27, 2006

**REMARKS**

Claims 1 - 24 are canceled without prejudice or disclaimer.

Claims 25 and 30 have been amended in order to more particularly point out, and distinctly claim the subject matter to which the applicants regard as their invention. The applicants respectfully submit that no new matter has been added. It is believed that this Amendment is fully responsive to the Office Action dated September 27, 2006.

The Examiner continues to reject claims 25 - 33, relying again on Girardello as the primary reference. The rejections are discussed below.

Claims 25 - 33 are rejected under 35 USC §112, first paragraph, as failing to comply with the written description requirement. The Examiner alleges that the claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. In particular, the Examiner refers to the expression in claims 25 and 33 "said soft layer being attached to and between said inner and outer circumferential surfaces."

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In order to overcome this rejection, the applicants have amended claims 25 and 30 to delete the expression objected to by the Examiner.

Accordingly, the withdrawal of the outstanding rejection under 35 USC §112, first paragraph, is in order, and is therefore respectfully solicited.

Claims 25 - 33 are provisionally rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 22 - 25 of co-pending Application No. 11/367,432. The applicants respectfully request reconsideration of this rejection.

The applicants submit herewith an appropriate Terminal Disclaimer to overcome this rejection. Accordingly, the withdrawal of the outstanding obviousness-type double based on claims 22 - 25 of co-pending Application No. 11/367,432 is in order, and is therefore respectfully solicited.

Additionally, claims 25 - 26 and 28 - 29 are rejected under 35 USC §103 as being unpatentable over Girardello (U.S. Patent No. 6,193,820); and claims 27 and 30 - 33 are rejected under 35 USC §103(a) as being unpatentable over Girardello, and further in view of JP 401272719. The applicants respectfully request reconsideration of this rejection.

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In the “Response to Arguments” portion of the Office Action, the Examiner notes that support has not been provided for the drawings of Figs. 12 and 13 filed in the Preliminary Amendment of August 11, 2006, and comments on the amendment made in the same paper. Also, the Examiner questions the inclusion of martensite in a soft layer, and questions the soft layer as being “immediately next to outer and inner circumferential surfaces.”

A distinction between the claimed invention and the cited references is highlighted in the showing of a distinction between the claimed “soft layer” of the present core region and the corresponding core region of Girardello.

In Girardello’s bushing, which is shown in its finished condition in Fig. 8, a core region of the bushing is made up of sorbite<sup>1</sup>. As can be seen by referring to Fig. 6, which is described at column 5, lines 23 - 37, the core region that in the finished product is made up of sorbite, was initially martensite, which was formed in the first step of hardening the surface OD. The sorbite of the finished product resulted from tempering of that martensite, which is consistent with one definition of sorbite being “tempered martensite.”<sup>2</sup>

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<sup>1</sup> See, column 5, lines 64 - 67: “In the core there is also provided a sorbitic region which allows a toughness equal to that which can be obtained with the conventional method. . .”

<sup>2</sup> See, “Elements of Materials Science”, Appendix B, Sorbite - - Martensite tempered to give intermediate carbide agglomeration.

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Again referring to Fig. 8, in regions between martensite at the surface OD and the surface ID, and the core region of sorbite is found mixed transition structures. Such regions are known in the art, as an abrupt change in material structure of steel is not possible because heating and cooling to affect material structure formation cannot be controlled at exact boundaries.

The above-described structure of the steel of the core region of the bushing of Girardello is different in material structure from the core region of the present claimed invention.

In the present invention, martensite is never formed in the core region as taught at page 53, lines 4 - 7 of the applicants' specification:

Thanks to this advance cooling from the inner circumferential surface, the temperature of the bushing at the center in its cross section decreases to such a temperature range in which hardening does not occur, and as a result, an imperfectly hardened layer is created inside the wall of the bushing.

At page 51, lines 6 - 7 of the applicants' specification, it is disclosed that: "...the soft layer formed in the core is mostly composed of a bainitic structure having granular cementite dispersed therein."

Although it does not appear to be specifically mentioned in the present application, it is known in the art and mentioned in Girardello that "intermediate regions" exist between the

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martensite regions and core regions.<sup>3</sup> In order to further distinguish the applicants' claimed invention over Girardello, the claim must be written so as to define the core region only, without including the intermediate regions, as the intermediate regions can contain many different structures which may not be easily defined.

Therefore, independent claim 25 has been amended so as to recite as follows:

quench hardened layers formed so as to extend toward its core region from its outer circumferential surface and from its inner circumferential surface respectively;

a soft layer formed in the core region between said quench hardened layer; and

intermediate layers formed between said soft layer and each said quench hardened layer.

Although the Examiner has mentioned at pages 4 and 5 of the Office Action that a claimed process in a product claim does not affect the patentability of the claim, recitation of the process is not prohibited and therefore the process steps are not deleted from the claims.

In view of the above, the withdrawal of the outstanding obviousness rejections under 35 USC §103 based on Girardello (U.S. Patent No. 6,193,820), and under 35 USC §103(a) based on Girardello, and further in view of JP 401272719 is in order, and is therefore respectfully solicited.

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<sup>3</sup> See, for example, claim 5 of Girardello.

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In view of the aforementioned amendments and accompanying remarks, claims, as amended, are in condition for allowance, which action, at an early date, is requested.

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact the applicants' undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, the applicants respectfully petition for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper to Deposit Account No. 01-2340.

Respectfully submitted,  
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